EVALUATING THE NATURE OF SUPPLY CHAIN COLLABORATION: A CASE STUDY OF IMPERIAL LOGISTICS

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ABSTRACT

Despite the increasing dependency by firms, on supply chain collaboration the establishment of formal collaborative relationships is still limited. The aim of this paper is to evaluate the nature of supply chain collaboration within Imperial Logistics using the case study approach. The results showed that the internal collaboration was well established in Imperial Logistics. Trust with partners tended to be limited resulting in limited warehouse information sharing. The collaborative networks were found to derive mutual benefits and risk sharing between the collaborative partners, particularly in the areas of establishment of long-term alliances with partners and performance measures. It is recommended that management invest in developing of tactical and strategic collaborative relationships and to invest in common information systems in order to derive greater benefits from collaboration as existing relationships seems to be arms' length relationships.

Keywords: supply chain collaboration, information flow, collaboration networks, South Africa

1. INTRODUCTION

The success of business operations is now dependent on the cumulative efforts of various players in the supply chain. Uncoordinated individualistic efforts by firms in the supply chain cause a mismatch between demand and supply resulting in losses resulting from stock-out costs excess inventory costs, obsolescence and disposal costs (Simatupang & Sridharan, 2002). In order to respond quickly to changing customer demand and complexities in the supply chain, companies are increasingly dependent on the performance of entire supply chains through supply chain collaboration (Ramanathan, 2014). The derived benefits of collaboration in a supply chain include cost reductions, increased sales revenue, and improved forecast estimates (Ramanathan & Gunasekaran, 2014).

Despite the advantages of supply chain collaboration, Barrat (2004) and Ramanathan *et al*. (2011) found that the establishment of formal collaborative relationships is still limited owing to the limited understanding of the nature of collaboration and its long-term impacts and benefits. Ireland and Bruce (2000) found that supply chain collaboration is difficult to implement. In a study of the barriers to the successful development of collaborative planning, forecasting and replenishment (CPFR) initiatives, Barrat and Oliveira (2001) found that one of the key impediments was the lack of well-defined collaborative objectives and responsibilities with partners. Sabath and Fonanelly (2002) further highlighted that this is further exacerbated by companies' misconceptions and beliefs that e-commerce is the panacea to wide scale inter-organisational collaboration which result in insufficient resources being invested in the crucial stage of determining objectives of the collaboration as well as the roles of the partners.

2. PROBLEM INVESTIGATED

The aim of this paper is to evaluate the nature of supply chain collaboration within a leading logistics service provider, Imperial Logistics.

3. RESEARCH OBJECTIVES

The research objectives of this paper are to:

i. Determine the nature of internal collaboration within Imperial Logistics
ii. Determine the nature of information flow within Imperial Logistics,
iii. Determine the nature collaboration between Imperial Logistics and its customers
iv. Determine the extent of Imperial Logistics' collaboration networks

4. LITERATURE REVIEW

The nature of supply chain collaboration varies according to different authors. Collaborating firms cooperate on strategic, tactical and operational levels on activities that include planning, forecasting, replenishment, information sharing, resource sharing and incentive sharing (Ramanathan &

Muyldermans, 2010; Aviv, 2007; Toktay *et al*., 2000). Barrat (2004) categorises collaboration into vertical and horizontal integration. Vertical collaboration includes internal collaboration within the organisation, external collaboration with suppliers (upstream) and external collaboration with customers (downstream). Internal collaboration is also known as functional collaboration and involves different departments in a company working collaboratively. Examples include the integration of logistics and marketing departments (Ellinger, 2002) manufacturing and purchasing (Fawcett & Magnan, 2002) or comprehensive internal integration of marketing, logistics, manufacturing and purchasing. Collaboration with customers entails demand planning and replenishment, customer relationship management or shared distribution. External collaboration with suppliers may involve new product development, collaborative scheduling and/ or transportation amongst others. Horizontal collaboration comprises external collaboration with competitors or other organisations through sharing manufacturing facilities, for example. Collaboration is a complex process and the critical success factors need to be in place for it to succeed (Ralston, Richey & Grawe, 2017). The following section discusses some of the main determinant of supply chain collaboration.

Determinants of supply chain collaboration

Trust

Schmitz (1999) defined trust as "the willingness to expose oneself to the possibility of opportunistic behaviour by others". Collaboration requires trust. This, in turn, requires the discouragement of free market models and policies to promote competition (Barkley *et al.*, 2010). This is because inter-firm rivalry reduces networking and the provision of collective services such as new product development, marketing information, technology development and transfer and labour (Barkley *et al.*, 1997). Trust is a crucial element that facilitates the effective communal use of resources such as machinery; technology and technical know-how among collaborating firms. Trust is crucial to maximise the cumulative and recurrent collective efficiency gains to collaborating firms (Schmitz, 1999; Tsanos *et al.*, 2014; Nyaga *et al*., 2010; Fawcett *et al*., 2008). The success of collaborative firms is endogenous to the supply chain and therefore trust is essential to ensure that firms devote their operations to their collective success rather than rivalry (Ralston *et al*., 2017). Trust ensures that antagonistic competition is discouraged thereby nurturing trust, cooperation, coordination, flexibility and collective action.

The basis for the development of trust varies among authors. Earned trust also known as process-based trust (Zucker, 1986), refers to trust derived from either personal experience or the reputation of doing business with a particular individual, family, ethnic group or local community is a common source of trust amongst firms collaboration in a supply chain (Narayanan *et al*., 2015; Allred *et al.,* 2011). The competitive strength and success of collaborating depends on the social embeddedness and social integration of networks that facilitate coordination and cooperation between firms (Gordon & McCann,

2000). Social embeddedness and social integration develop from the norms, institutions and shared assumptions that exist among collaborating.

Social infrastructure

The success and effectiveness of supply chain collaboration are in part dependent on the existence of social infrastructure. Social infrastructure can be characterised as the common habits, routines, practices and rules that make up the socio-institutional and cultural setting that is prevailing in an area. Social infrastructure is essential for the effective flow of information between firms (Rosenfeld, 1997; Allred *et al*., 2011; Ekanayake, Childerhouse, & Sun, 2017). Effective collaboration requires social interaction trust and shared vision between members of the supply chain. Schmitz and Nadvi's (1999) highlighted that the existence of a trade network and the existence of social infrastructure minimised hindrances in collaboration among firms in industrial clusters. Social infrastructure creates dynamism, which creates interactions and functional relationships (Doeringer & Terkla 1995; Allred *et al*., 2011). Social networks promote innovation and the achievement of medium- and long-term innovative goals between firms.

Access to information

Impacted information, a form of market failure, occurs when firms do not have access to useful information or it is only available at a prohibitive cost (Enright, 2003). Access to information enhances the effectiveness of operations in supply chain collaboration in two ways. Firstly, networks and relationships are established through information sharing when firms collaborate. This ensures that customers can effectively communicate their needs in order for firms to produce the products that the customers want. Secondly, firms can communicate their needs to suppliers, or suppliers can communicate new trends or new products that they can provide. This will enable firms to fully utilise existing resources that they may not have been aware of. Collaboration depends on the existence of social infrastructure and trust. These elements act as the medium for the exchange of information (Rosenfeld, 2002). However, it is not just the access to information that enhances the supply chain's competitiveness, but also access to new information and ideas from other regions. Furthermore, collaboration with a lead firm that is part of global networks, is exposed to global market opportunities and employs members of international professional associations and networks reduces regional insularity and lock in. Access to information can also be enhanced by employing a diverse workforce, as well as accessing benchmark practices, innovations and markets. Institutional structures are another channel through which collaborating firms can access information and other services (Rosenfeld, 2002).

Highly developed legal system

In a study of East African firms, McCormick (1999) found that the survival and sustainability of collaboration among firms in clusters were greatly influenced by the nature of the legal system.

Ensuring observance of or obedience to business collaboration depends on the existence of a highly developed legal system. A highly developed legal system acknowledges and facilitates an economic environment suitable for collaboration and cooperation. The success of the Silicon Valley in the US was founded by the formation of a highly developed legal system to support the cluster formation process. The cluster attracted experienced litigators and judges housed in local and international law firms. A highly developed legal system provides services ranging from facilitating dispute resolutions, as well as assistance in the formation, funding and expansion of firms in the cluster. A weak legal framework for commercial and industrial activity does not provide any assurance about the enforceability of commercial contracts (McCormick, 1999). Enforceable commercial contracts ensure that firms are accountable through the law.

Trade networks

Trade and supplier networks create ties among firms from buyer-supplier relationships, common technologies, common buyers, common distribution channels or common labour pools (Whalley & Hertog, 2000). Empirical evidence suggests that trade and supplier networks are an effective and sustainable source of competitiveness for firms in Africa and Asia (Perry, 1999; Brautigam 1997). The inexistence of trade networks and lack of effective incentives reduce the mobility of financial and human resources among collaborating firms. This will lead to the dilution of the potential benefits of knowledge diffusion, learning and other spill-overs among firms. Supply chains with strong links to foreign markets established through traders have been shown to be more competitive and to earn higher incomes (Weijland, 1994). In East and Southern Africa, the poor infrastructure and poor distribution networks were identified as the main determinants of poor performance of small-scale producers (Pedersen *et al.*, 1994). High transport and transactional costs arise from poor infrastructure and poor distribution networks. Neither of the firms involved in a business transaction can lower these costs, resulting in the reduced mobility of financial and human resources. This, in turn, inhibits the full realisation of benefits from collaboration among firms.

Supply chain collaboration forms value networks (Lee, 2006). It goes beyond simple value chains characterised by cooperation in R&D, demonstration programmes, collective marketing, or purchasing policy. The value networks can also include vertical and/or horizontal linkages between firms. These linkages consist of dissimilar and complementary firms that specialise in the same knowledge base in the value network. Collaboration can enhance knowledge spill-overs through establishing joint ventures, contracts, alliances, or communication networks with experts in other regions or countries. A limited scope of external connections excludes firms from new knowledge and technology and consequently limits the firm's competitive position (Lee, 2006). Trade networks also ensure the successful internationalisation of collaborating firms. Established buyer-seller relationships minimise or eliminate the risks associated with internationalisation. In cases where collaboration is with

multinational firms, the probability of success in foreign market penetration is enhanced by (i) the multinationals' experience in international business, (ii) highly skilled human capital base, (iii) networks in international professional associations, and (iv) established links in foreign markets (Enright, 2003).

5. RESEARCH METHODOLOGY

The purpose of this research is to evaluate the nature of supply chain collaboration within Imperial Logistics. The design of research instrument was based on the conceptual framework that was derived from the literature review. The questionnaire was a structured and self-developed. The structured self-administered questionnaires consisted of seven sections. The first section requested demographic information on the characteristics of the respondents such as gender, level of education, and work experience; and the other sections measured the respondents' perceptions regarding internal as well as customer collaboration, information flow and the extent of collaborative networks. Respondents were requested to rate the individual statements within the different survey sections on a five point Likert scale, ranging from strongly disagree (1) to strongly disagree (5), to score the respondents' level of agreement with the different collaboration related statements.

The survey was distributed to operational managers involved in various Imperial Logistics contracts. Although convenience sampling was used, a poor response rate resulted in only 33 usable responses being available for analysis. A key limitation of the convenience sampling approach used is that generalisability from the obtained results is weakened (Zikmund *et al*., 2013). Through exploratory research, an insightful understanding of a specific subject can be obtained in a constructive manner. Exploratory research can be performed by searching for literature, interviewing professionals in the field of study, or conducting focus group interviews. A main advantage of exploratory research design is that it is not a rigid approach, as it allows for flexibility and is adaptable to changes (Saunders *et al*., 2009:139).

With the purpose of this research, a case study approach was followed and applied to a leading logistics service provider, Imperial Logistics. According to Robson (2002:179) a case study can be defined as a 'strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real-life context using multiple sources of evidence'. According to Yin (2009:5) the use of a case study can retain the holistic and meaningful characteristics of events, behaviour, processes of managers and organisation. For this research, a single case study on Imperial Logistics is used, which provided an exploratory understanding of the framework of the research and the collaborative initiatives that are being applied within Imperial Logistics and its supply chain partners to improve the overall performance of its supply chain (Saunders *et al*., 2009:146). Imperial Logistics is one of the three main divisions of the diversified Imperial L Holdings Group. It is perceived as a leading

global logistics and supply chain service provider that offers fundamental logistics as well as end-to-end supply chain management solutions to customers in a diversity of industries.

6. RESULTS/ FINDINGS

To determine the internal consistency of the self-developed research instrument the reliability of the measurement scale was assessed. The survey data was analysed using SPSS for Windows version 24. The profile of the respondents is shown in Table 1 below. The questionnaire was completed by 33 respondents of which 79 per cent were male and 21 per cent were female and represents the gender configuration within the case study organisation. A Grant Thornton report showed that the rate of women in senior management positions in South Africa has declined from 27 per cent to 23 per cent while 39 per cent of organisations had no women in senior positions (Grant Thornton, 2016). The majority of the respondents had a diploma (30%), followed by degrees (24%), high school (18%), post graduate (15%) and certificates (12%). In terms of work experience, the average years of work experience for all respondents was 16.8 years with the average work experience in the area of logistics and supply chain management being over 10.3 years. 54% of the respondents had over 16 years experience.

Table 1: Demographic profile of respondents

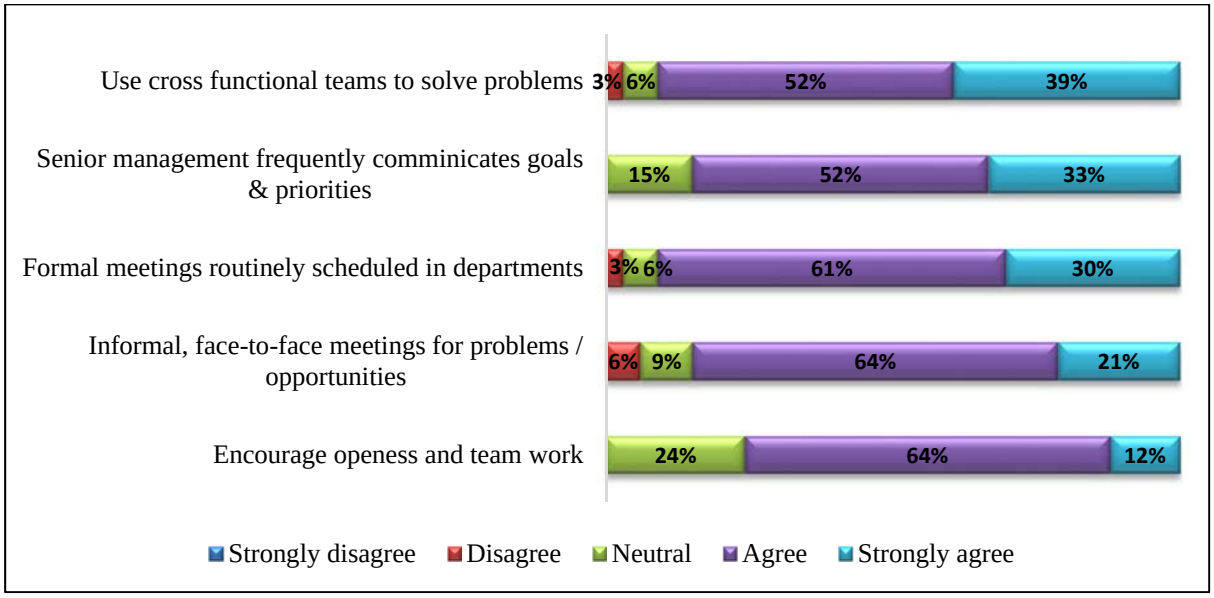
Characteristics		Percentage of respondents
Gender	Male	79%
	Female	21%
Education level	High school	18%
	Certificate	12%
	Diploma	31%
	Degree	24%
	Post graduate degree	15%
Work experience	1 to 5 years	21%
	6 to 10 years	9%
	11 to 15 years	16%
	16 to 20 years	27%
	21 to 25 years	12%
	>25 years	15%

As mentioned previously, the respondents were required to indicate, on a 5-point Likert-type scale, their level of agreement with a list of 19 supply chain collaborative initiative statements (indicators) that

assessed internal collaboration, information flow, customer collaboration and extent of collaboration networks. The calculated overall Cronbach's α values for the internal collaboration, customer collaboration, information flow and collaborating networks segments was 0.807, which indicate a moderately high internal consistency. According to Field (2013) this indicates that the questionnaire segments are very reliable.

Figure 1 illustrates the results on the evaluation of existing internal collaboration practices. The use of cross-functional teams and the scheduling of routine departmental meetings are well established practices as 91% of respondents agreed and strongly agreed with these statements. Frequent communication on goals and priorities from top management and informal face to face meetings for opportunities or problems are also well established. The encouragement of openness and teamwork was not as well established as the other practices as 24% of the respondents were neutral about this statement. This implies that internal collaboration within Imperial Logistics is relatively well established. Established and functional internal collaboration is identified in the literature as a crucial first step to success collaboration. Companies that lack effective internal collaboration are likely to be unsuccessful in external collaboration initiatives (Barrat & Green, 2001).

Figure 1: Internal collaboration

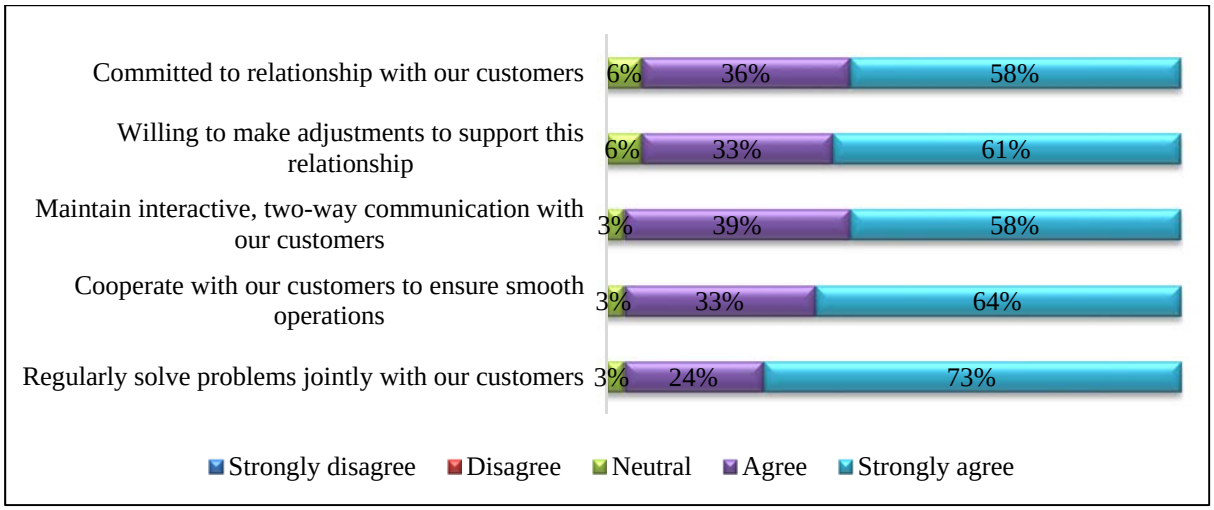


Source: Calculated from survey results

The respondents' rankings of existing practices with regards to collaboration with customers are illustrated in Figure 2. The results show that the respondents tend to strongly agree with all the statements that evaluate the organisation's commitment to satisfy its customers. In particular, regular interaction with customers to jointly solve problems was ranked as a common and established practice (73% of respondents strongly agreed). Similarly, cooperation with customers to ensure smooth

operation and willingness to make adjustments to support the customer were perceived as well established practices as 64% and 61% of respondents strongly agreed respectively, with these statements.

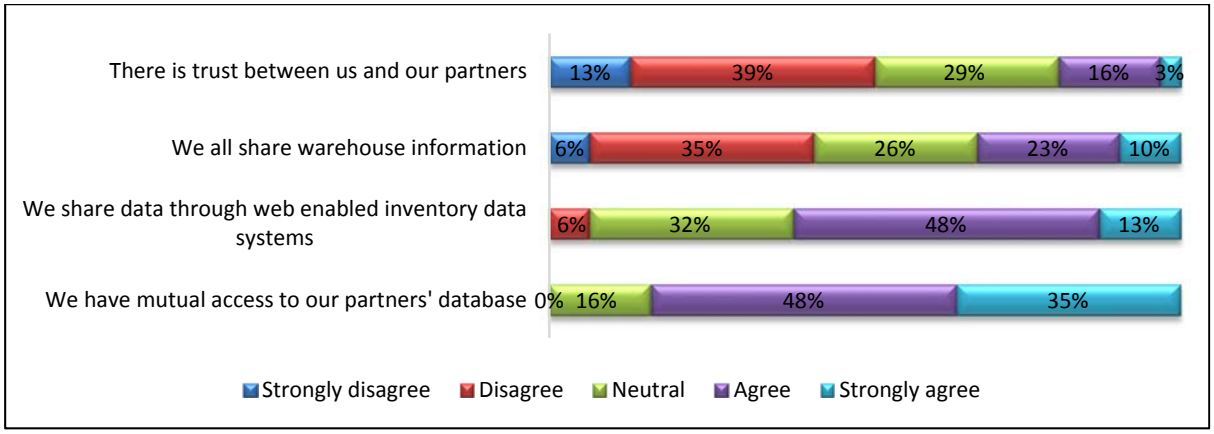
Figure 2: Customer collaboration



Source: Calculated from survey results

Assessment of the nature of information flow, with collaboration partners, revealed that trust tended to be limited. 52% (13% strongly disagreed and 39% disagreed) of the respondents indicated that trust between the organisation and the partners did not exist (see Figure 3). In the same way, the rankings for warehouse information sharing indicate limited operational collaboration. This may imply that the nature of this collaboration is "arm's length" or pure cost based type relationship between the collaborative partners (Barrat, 2004). The utilisation of web enabled inventory data systems is evident as 61% of the respondents indicated as illustrated in Figure 3. This seems to enable mutual access to partners' databases as 83% of the respondents indicated. Barrat (2004) indicated that system integration facilitates information sharing.

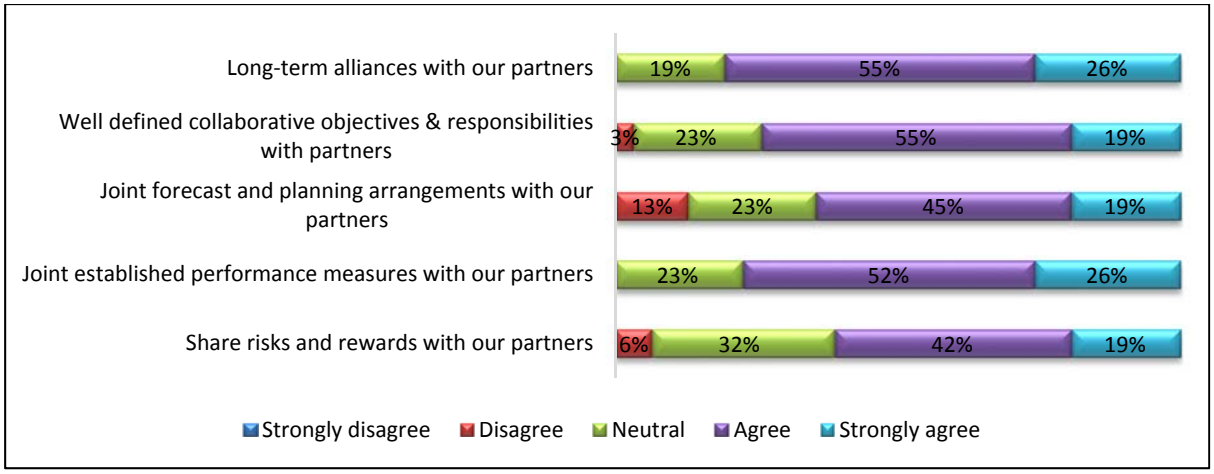
Figure 3: Information flow



Source: Calculated from survey results

The managers, were asked indicate the extent or scope of the collaboration networks. Figure 4 shows that the respondents generally agree that the collaborative networks derive mutual benefits and risk sharing with collaborative partners. Mutual benefits and risk sharing are essential for effective collaboration (Ireland & Bruce, 2000; McIvor & McHugh, 2000). The greatest number of positive responses (agree and strongly agree) were recorded for the statements; 'long term alliances with partners'; 'joint established performance measures with partners' and 'well defined collaborative objectives and responsibilities with partners'. Some managers doubt the extent of reward and risk sharing (6% disagreed and 32% were neutral); joint established performance measures with partners (13% disagreed and 23% were neutral) and well defined collaborative objectives and responsibilities with partners (3% disagreed and 23% were neutral).

Figure 4: Collaborative networks



Source: Calculated from survey results

Table 2 shows the means and standard deviations of the responses on each collaborative initiative. The mean and standard deviation were calculated to derive the descriptive profile of the variables. The ranking of these collaborative strategies in terms of the perceived importance by the respondents was also established. Overall, the top five ranked initiatives were all from the customer collaboration initiatives. This may imply that collaboration efforts are focused on a smaller section of the supply chain, in this case the customers. Successful supply chain collaboration requires significant investment and as a result, companies may opt for segmented collaboration where they focus on a few niche of strategically important customers (Tang & Gattorna, 2003). In this way, different strategies can be implemented to meet the different segments' need (Barrat, 2004). The sharing of data through web enabled inventory data systems and mutual access to partners' databases received the lowest mean score overall and had the highest standard deviations relative to all other statements. The underlying reasons for limited collaboration on these two initiatives may be attributed to boundaries arising from cross-

functional activities between the organisations. These have been shown to restrict information flow owing to limited tactical and strategic collaboration (Khan & Mentzer, 1996; Lee & Whang, 2000; Ellinger, 2001).

Table 2: Mean rating of collaborative initiatives

Ranking	Collaborative statement	Mean	Std. Deviation
1	Committed to relationship with our customers	4.70	0.53
2	Willing to make adjustments to support this relationship	4.61	0.56
3	Cooperate with our customers to ensure smooth operations	4.55	0.62
4	Maintain interactive, two-way communication with our customers	4.55	0.56
5	Regularly solve problems jointly with our customers	4.52	0.62
6	Encourage openess and team work	4.27	0.72
7	There is trust between us and our partners	4.19	0.70
8	Formal meetings routinely scheduled in departments	4.18	0.68
9	Informal, face-to-face meetings when problems / opportunities arise	4.18	0.68
10	Long-term alliances with our partners	4.06	0.68
11	Joint established performance measures with our partners	4.03	0.71
12	Senior management frequently comminicates goals & priorities	4.00	0.75
13	Well defined collaborative objectives and responsibilities with our partners	3.90	0.75
14	Use cross functional teams to solve problems	3.88	0.60
15	Share risks and rewards with our partners	3.74	0.86
16	Joint forecast and planning arrangements with our partners	3.71	0.94
17	We all share warehouse information	3.68	0.79
18	We share data through web enabled inventory data systems	2.94	1.12
19	We have mutual access to our partners' database	2.58	1.03

7. MANAGERIAL IMPLICATIONS

The results revealed that the rankings for warehouse information sharing indicate limited operational collaboration. This may imply that the nature of this collaboration is “arm’s length” or pure cost based type relationship between the collaborative partners. It is recommended that management invest more in deepening the nature of collaboration in order to derive greater benefits from collaboration as arms’ length relationships have been shown to derive limited benefits to collaborative partners (Lambert & Burdurough, 2000; Horvatto, 2001). In addition, information sharing through web-enabled inventory systems was low. Management could additionally invest in common information systems with collaborative partners to facilitate full integration with partners.

8. CONCLUSIONS

The aim of this paper was to evaluate the nature of supply chain collaboration within a leading logistics service provider, Imperial Logistics. The case study approach was employed to evaluate the extent of collaboration. The respondents were required to indicate, on a 5-point Likert-type scale, their level of agreement with a list of 19 supply chain collaborative initiative statements (indicators) that assessed

internal collaboration, information flow, customer collaboration and extent of collaboration networks. The results showed that internal collaboration practices within Imperial Logistics are relatively well established. Established and functional internal collaboration were identified in the literature as a crucial first step to successful external collaboration.

The respondents' rankings of existing practices with regards to collaboration with customers revealed that that the respondents tend to strongly agree with all the statements that evaluate the organisation's commitment to satisfy its customers. An assessment of the nature of information flow, with collaboration partners, revealed that trust with partners tended to be limited. Similarly, the rankings for warehouse information sharing indicate limited operational collaboration. This may imply that the nature of this collaboration is "arm's length" or pure cost based type relationship between the collaborative partners.

The managers, were asked indicate the extent or scope of the collaboration networks. The respondents generally agreed that the collaborative networks derive mutual benefits and risk sharing with collaborative partners particularly in the areas of establishment of long term alliances with partners and performance measures with. Some managers were found to doubt the extent of reward and risk sharing; joint established performance measures with partners and well defined collaborative objectives and responsibilities with partners.

Lastly, the means and standard deviations of the responses on each collaborative initiative were calculated to derive the descriptive profile of the variables. The ranking of these collaborative strategies in terms of the perceived importance by the respondents was also established. Overall, the top five ranked initiatives were all from the customer collaboration initiatives. This may imply that collaboration efforts are focused on a smaller section of the supply chain, in this case the customers to ensure that the needs of a few niche of strategically important customers are met. The sharing of data through web enabled inventory data systems and mutual access to partners' databases received the lowest mean score overall and had the highest standard deviations relative to all other statements. The underlying reasons for limited collaboration on these two initiatives may be attributed to boundaries arising from cross-functional activities between the organisations which result in restricted information flow.

The limitations of the study are that the sample was restricted to Imperial Logistics and which limits inference of the results to other logistics service providers. Methodologically, the study also presents a limitation because the results are based on the perceptions of the managers at Imperial Logistics and not based on hard data. Future research could focus on collecting hard data to enable the measurement of these variables and enable statistical to be conducted.

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